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## EUROPEAN PATENT APPLICATION

②1 Application number: 88117382.7

②1 Int. Cl.4: A63B 31/11 , A63B 31/16

②2 Date of filing: 22.04.85

②3 Priority: 03.05.84 IT 1250784

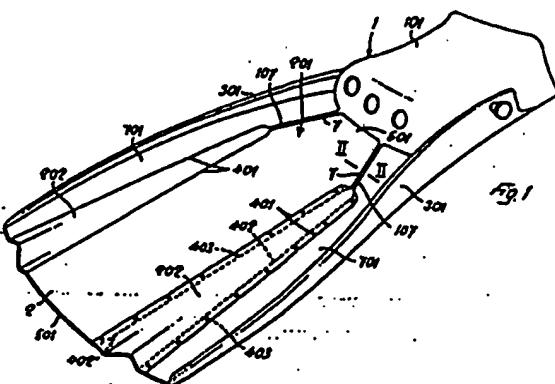
②1 Applicant: AMF MARES S.p.A.  
Via Cerisola Borghetto37  
I-16035 Rapallo - Genova(IT)②4 Date of publication of application:  
29.03.89 Bulletin 89/13②2 Inventor: Garofalo, Giovanni  
Via San Massimo 39  
I-16035 Rapallo(IT)②5 Publication number of the earlier application in  
accordance with Art.76 EPC: 0 160 261②3 Representative: Porsia, Attilio et al  
c/o Succ. Ing. Fischetti & Weber-Dr. Porsia  
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I-16124 Genova(IT)②6 Designated Contracting States:  
AT BE CH DE FR GB IT LI LU NL SE②7 Date of deferred publication of the search report:  
06.09.89 Bulletin 89/36

④ Method of producing a swim fin.

⑤ A method of producing a swim fin comprising a shoe portion (101) made of a first, comparatively supple, moldable material;  
 a blade portion (201) made of a second comparatively stiff material; said blade portion (201) and said shoe portion (101) being connected together in a stable manner by molding in a mold said shoe portion (101) on said blade portion (201), characterized in that said blade portion (201) is provided with at least one longitudinally extending deformable membrane like element (202), and by the fact that the method comprises the steps of:

- forming at least one longitudinal slit (401) into said blade portion (201), extending from the free fore end (501) of said blade portion (201) up to in proximity of the root end (601) of said blade portion (201);
- forming at least one groove (7) or channel in the said blade portion (201), and/or the mold associated with said blade portion (201), extending from said shoe portion (101) up to said slit (401), and
- allowing, concurrently with the molding operation of said shoe portion, the flow (107) of said first moldable material into said slits (401) to form

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## EUROPEAN SEARCH REPORT

EP 88 11 7382

| DOCUMENTS CONSIDERED TO BE RELEVANT   |   |  |   |
|---|---|--|---|
| Category  | Citation of document with indication, where appropriate, of relevant passages                   | Relevant to claim  | CLASSIFICATION OF THE APPLICATION (Int. Cl.4) |
| A   | FR-A-2 115 724 (FORJOT)<br>* Page 3, line 12 - page 4, line 5;<br>figures 1-3 *                 | 1,2  | A 63 B 31/11<br>A 63 B 31/16                  |
| A,D   | FR-A-2 213 072 (AMF MARES SUB S.p.A.)<br>* Page 4, line 7 - page 6, line 10;<br>figures 1,4-8 * | 1  |   |
| A   | WO-A-8 101 263 (VAN ERVEN)<br>* Page 9, lines 1-14; figure 8 *                                  | 1  |   |
| A   | FR-A-2 058 941 (RAVERA et al.)<br>* Page 2, lines 9-26; figures 1-3 *                           | 1  |   |
| TECHNICAL FIELDS<br>SEARCHED (Int. Cl.4)  |   |  |   |
| A 63 B<br>B 29 C  |   |  |   |
| The present search report has been drawn up for all claims  |   |  |   |
| Place of search   | Date of completion of the search  | Examiner   |   |
| THE HAGUE   | 02-06-1989  | SCHOENLEBEN J.E.F.   |   |
| CATEGORY OF CITED DOCUMENTS   |   |  |   |
| X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |   | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |   |

(2)

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(22) Date of filing: 22.04.85

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(60) Designated Contracting States:  
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(54) Method of producing a swim fin.

(57) A method of producing a swim fin comprising a  
shoe portion made of a first, comparatively supple,  
moldable material;

a blade portion made of a second comparatively stiff  
material; said blade portion and said shoe portion  
being connected together in a stable manner by  
molding in a mold said shoe portion on said blade  
portion, characterized in that said blade portion is  
provided with at least one longitudinally extending  
deformable membrane like element, and by the fact  
that the method comprises the steps of:

a) forming at least one longitudinal slit into  
said blade portion, extending from the free fore  
end of said blade portion up to in proximity of the  
root end of said blade portion;

b) forming at least one groove or channel in  
the said blade portion and/or the mold associated  
with said blade portion, extending from said shoe  
portion up to said slit, and

c) allowing, concurrently with the molding op-  
eration of said shoe portion, the flow of said first  
moldable material into said slits to form the said  
membrane-like element.

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The present application is divided out from application Serial number 85104869.4-2311 filed April 22nd, 1985, and is directed to a method of producing swim fins, and more particularly to the fins of the kind in which the fluid jet or fluid flow produced during the propulsive swimming step is directed and conveyed in the active propulsion direction.

From FR-A-2 506 612 there is known a swim fin comprising a shoe portion and a blade portion connected at its root end to said shoe portion, wherein said fin comprises at least in the central region of said blade portion a dynamically deformable self-shaping section giving rise to a fluid flow conveying canal which is self-shaped in opposition to each swimming stroke, so that the said canal is automatically inverted by inverting the swimming stroke so as to exert its fluid flow conveying action during both swimming strokes.

From US-A-3 411 165 there is known a swim fin the blade of which comprises substantially inflexible forward extending ribs and a nonstretched bellied web the marginal portions of which are secured to the said ribs by using rubber adhesion techniques.

From FR-A-2 213 072 there is known a swim fin comprising all the features defined in the preamble of claim 1 of my co-pending application number 85104869.4-2311.

In my co-pending application number 85104869.4-2311 a method is claimed of producing a swim fin comprising a shoe portion made of a first moldable material; a blade portion made of a second comparatively stiff material said blade portion and said shoe portion being connected together in a stable manner by molding in a mold said shoe portion on said blade portion, characterized in that said blade portion is provided with transversely bowed, longitudinally extending, membrane like elements, and by the fact that the method comprises the steps of:

a) forming two longitudinal slits into said blade portion, extending from the free fore end of said blade portion up to in proximity of the root end of said blade portion;

b) forming at least one groove or channel in the said blade portion, and/or on the mold associated with said blade portion, extending from said shoe portion up to said slits, and

c) allowing, concurrently with the molding operation of said shoe portion, the flow of said first moldable material into said slits to form the said membrane-like elements.

It is the object of the present invention a method of producing a swim fin comprising all the features defined in the preamble of claim 1 of my above mentioned co-pending application, in combination with the features mentioned at points (b) and (c) of said claim 1, characterized by the fact that the blade portion of the fin is provided with an odd number of slits ranging from one central slit to three slits.

Further objects, features and advantages of the fin according to the invention will be evident from the following description of some preferred embodiments of the invention, made with reference to the annexed drawings, in which:

Figure 1 is a perspective view of a fin according to one embodiment of the invention, and  
Figure 2 is a particular in enlarged scale in cross section along line II-II, of the fin shown in Figure 1

With reference to the drawing, the numeral 1 generally denotes the fin according to the invention.

The said fin comprises, in a manner per se known, a shoe portion 101, a blade portion, shown generally by reference numeral 201, and two side ribs 301 for stiffening the blade 201. According to the invention, the blade 201 is sidewise provided with longitudinal slits 401 extending in a direction substantially parallel to the side ribs 301, from the free edge 501 of the blade up to in proximity of the root portion 601 of the blade 201.

The apex of the slits 401 formed in the blade 201, made of a comparatively stiff material, is connected to the outermost end of the root portion 601 of the blade by means for instance of grooves 7 formed in the said root portion 601 of the blade during the molding operation of the blade itself.

During the following molding step of the shoe portion of the fin, which is made of a more supple and flexible material, and for instance of thermoplastic rubber, the thermoplastic rubber is allowed to flow through said grooves 7, in form of a fluid ribbon 107, up to the interior of the slits 401, filling completely said slits and thus forming the membrane like portions 202, which are in this manner perfectly welded to the remaining portions of the fin blade.

Of course the grooves 7 may be formed instead of on the fin blade, on the mold surfaces, or on both said elements. Moreover, although the membrane portions 202 have been shown as having a thickness which is substantially equal to the thickness of the blade portion of the fin, they may be made obviously less thick than the blade portion

of the fin.

In order to further improve the bond between the membrane 202 and the blade sections 2 and 701, the edges of the slits 401 may be provided with a tenon-like ridge 402, provided with a number of through holes 403, which are filled, during the molding operation, by the membrane 202 forming-material, thus assuring a secure bond between said membrane 202 and the blade elements 2, 701.

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### Claims

1) A method of producing a swim fin comprising a shoe portion (101) made of a first, comparatively supple, moldable material;

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a blade portion (201) made of a second comparatively stiff material; said blade portion (201) and said shoe portion (101) being connected together in a stable manner by molding in a mold said shoe portion (101) on said blade portion (201), characterized in that said blade portion is provided with at least one longitudinally extending deformable membrane like element, and by the fact that the method comprises the steps of:

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a) forming at least one longitudinal slit (401) into said blade portion (201), extending from the free fore end (501) of said blade portion (201) up to in proximity of the root end (601) of said blade portion (201);

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b) forming at least one groove (7) or channel in the said blade portion (201), and/or the mold associated with said blade portion (201), extending from said shoe portion (101) up to said slit (401), and

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c) allowing, concurrently with the molding operation of said shoe portion, the flow (107) of said first moldable material into said slits (401) to form the said membrane-like element (202).

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2) The method according to claim 1, in which the said slits (401) are in odd number, preferably ranging from one to three.

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